MASTER OF SCIENCE
IN
SOFTWARE ENGINEERING

APPLICATION PROGRAMMER'S INTERFACE (API) FOR HETEROGENEOUS LANGUAGE ENVIRONMENT AND UPGRADING THE LEGACY EMBEDDED SOFTWARE

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Legacy software systems in the Department of Defense (DoD) have been evolving and are becoming increasingly complex while providing more functionality. The shortage of original software designs, lack of corporate knowledge and software design documentation, unsupported programming languages, and obsolete real-time operating system and development tools have become critical issues for the acquisition community. Consequently, these systems are now very costly to maintain and upgrade in order to meet current and future functional and nonfunctional requirements.

This thesis proposes a new interoperability model for re-engineering of old procedural software of the Multifunctional Information Distributed System Low Volume Terminal (MIDS-LVT) to a modern object-oriented architecture. In the MIDS-LVT modernization acquisition strategy, only one Computer Software Configuration Item (CSCI) component at a time will be redesigned into an object-oriented program while interoperability with other unmodified CSCIs in the MIDS-LVT distributed environment must be maintained. Using this model, each legacy CSCI component can be redesigned independently without affecting the others.

A GUIDE TO SELECTING SOFTWARE METRICS FOR THE ACQUISITION OF WEAPON SYSTEMS

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Modernization of Department of Defense (DoD) weapon systems has resulted in an ever-increasing dependence on software. Despite technological advances in the software field, software development remains costly and one of the highest risk factors on most weapon system programs. The use of software metrics is a methodology for mitigating this uncertainty so that software development progresses under informed decision making. Software metrics are essential tracking tools used by program managers to monitor and control risk areas. However, the choice of metrics for a program is critical to their usefulness. This research provides a guide to acquisition managers on selecting the most effective metrics to use in management of weapon system software. The study identifies key issues in the use of software metrics experienced by program managers. The study recommends a revised set of metrics and improvements to the use of metrics based on innovations and improvements in the software field as well as software estimation tools that facilitate the use of these software metrics.

INTEGRATED DEVELOPMENT ENVIRONMENT (IDE) FOR THE CONSTRUCTION OF A FEDERATION INTEROPERABILITY OBJECT MODEL (FIOM)

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Advances in computer communications technology, the recognition of common areas of functionality in related systems, and an increased awareness of how enhanced information access can lead to improved capability, are driving an interest toward integration of current stand-alone systems to meet future system requirements. However, differences in hardware platforms, software architectures, operating systems, host languages, and data representation have resulted in scores of stand-alone systems that are unable to interoperate properly.

Young's Object Oriented Model for Interoperability (OOMI) defines an architecture and suite of software tools for resolving data representational differences between systems in order to achieve the desired system interoperability. The Federation Interoperability Object Model (FIOM) Integrated Development Environment (IDE) detailed in this thesis is a toolset that provides computer aid to the task of creating and managing an interoperable federation of systems.

This thesis describes the vision and requirements for this tool along with an initial prototype demonstrating how emerging technologies such as XML and Data Binding are utilized to capture the necessary information required to resolve data representational differences between systems. The material presented in this thesis has the potential to significantly reduce the cost and effort required for achieving interoperability between DoD systems.